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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/855,235
Filing Date: May 14, 2001
Appellant(s): HALL ET AL.

Carmen Santa Maria
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 28 May 2004.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

The appellant's statement in the brief that certain claims do not stand or fall together is not agreed with because arguments for the separate patentability of the claims that do not stand or fall together are not found in "Arguments" section of appellants' Appeal Brief.

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,543,245	ANDRIEU	08-1996
6,027,836	OKADA	02-2000
6,193,946	KAWANO	02-2001
6,428,930	MAEDA	08-200

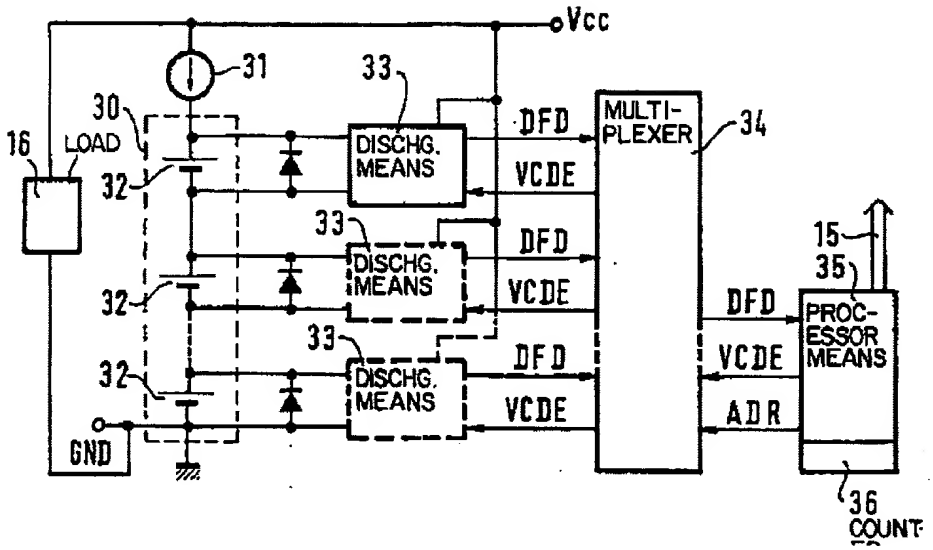
(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-6, 8, 9, and 12-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andrieu et al., US Patent 5,543,245 in view of Kawano et al., US Patent 6,193,946.

Andrieu et al. disclose a system for monitoring a plurality of battery cells. As seen in Fig. 3, each battery cell (32) includes a diode connected between the anode and cathode of that cell. The diodes can be Schottky type diodes. (column 6, lines 2-3.) The battery cells 32 can be lithium carbon batteries. (Column 2, lines 48-51.)

FIG.3



The disclosure of Andrieu et al. differs from applicants claims in that Andrieu et al. do not describe details of the battery cathode active elements, the electrolyte, or current collectors. Kawano et al. disclose spirally wound lithium non-aqueous batteries (Fig. 1 and column 6, lines 51-61.) The cathode active materials are lithium composite oxides, and $LiNi_{1-x-y}Co_xAl_yO_2$ is a preferable material. (Column 4, lines 7-10.) A preferred anode material is graphite. (Column 5, lines 55-57.) A preferred anode contains a copper current collector, and a preferred cathode contains an aluminum current collector. (Column 7, lines 7-22.) Preferred electrolytes contain a lithium salt and organic carbonate solvents. (Column 7, lines 33-36.) Kawano et al. teach that their inventive battery has a high energy density, various superior characteristics, and a high safety level. (column 5, lines 49-57.) Therefore, it would have been obvious to one of ordinary skill in the art to use the battery cells disclosed by Kawano et al.

in the system disclosed by Andrieu et al. in order to have a system with high energy density and high safety.

Claims 7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andrieu et al. in view of Kawano et al. as applied to claim 1 above, and further in view of Okada et al., US Patent 6,027,836. Andrieu et al. in combination with Kawano et al. disclose applicants' invention essentially as claimed, with the exception that neither Kawano et al. nor Andrieu et al. disclose a microporous polyvinylidene fluoride (PVDF) separator and do not disclose prismatic batteries. Okada et al. teach prismatic lithium ion batteries having microporous PVDF separators. (Column 5, lines 44-49.) The prismatic microporous PVDF separators are shown to have superior discharge capacity compared with batteries having conventional polyolefin separators. (Column 6, lines 20-29.) Therefore, it would have been obvious to one of ordinary skill in the art to use the microporous PVDF separator disclosed by Okada et al. in the battery disclosed by Kawano et al. in order to improve discharge capacity. It would have been obvious to one of ordinary skill in the art to form a battery having a microporous PVDF separator as a prismatic battery because this is the battery shape taught by Okada et al. for use with the microporous PVDF separators.

Claims 1, 2, 3, 5, 6, 8, 9, 11-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andrieu et al. in view of Maeda et al., US Patent

6,428,930. As discussed above, Andrieu et al. disclose a system for monitoring a plurality of battery cells (32) which include diodes connected between the anode and cathode of each cell. The diodes can be Schottky type diodes. (See Andrieu et al., column 6, lines 2-3.) The battery cells 32 can be lithium carbon batteries. (Column 2, lines 48-51.)

The disclosure of Andrieu et al. differs from applicants claims in that Andrieu et al. do not describe details of the battery cathode active elements, the electrolyte, or current collectors. Maeda et al. disclose spirally-wound lithium secondary batteries which include an anode of carbon active material pasted on a copper current collector and a cathode having a mixture of lithium metal oxides with an aluminum current collector. (See Maeda et al., column 5, lines 7-38.) In a specific embodiment, the cathode active material is a mixture of $LiNiO_2$ and $LiCo_{0.5}Ni_{0.5}O_2$. (See Maeda et al., column 7, line 9.) The electrolyte is a lithium salt dissolved in a mixture of organic carbonates. (See Maeda et al., column 5, lines 40-45.) Maeda et al. teach that their inventive batteries can suppress temperature rises in the batteries during charge and discharge, and therefore, the cycle life of the batteries can be improved. Therefore, it would have been obvious to one of ordinary skill in the art to use the batteries disclosed by Maeda et al. in the battery system disclosed by Andrieu et al. in order to improve the cycle life of batteries in the Andrieu et al. invention.

(11) Response to Argument

Appellants assert Andrieu et al. do not disclose "a Schottky diode connected between the anode and the cathode of the electrochemical cell." In response, it is noted that Andrieu et al. clearly show diodes connected between the anodes and cathodes of cells (32) in Figures 3, 4 and 6. Appellant asserts it is impossible to know how the diodes, discussed by Andrieu et al. at column 5, line 66 – column 6, line 3, are connected because at column 5 line 66, the diodes are described as "(not shown)". In reply, please notice the diode is further described by Andrieu et al. as "protecting it (the cell) against polarity reversal if the battery 30 is required to supply power during testing of a cell." Thus, one of ordinary skill in the art would understand that in order to protect the cell as described, the diode must be placed between the anode and cathode of the cell to block current flow, as illustrated in Figures 3, 4, and 6. Thus, based upon the Andrieu et al. disclosure as a whole, the diodes illustrated but not labeled in Figures 3, 4, and 6 would be identified as the diodes disclosed by Andrieu et al. as protecting cells against polarity reversal if the battery 30 is required to supply power during testing of a cell, and which are Schottky type diodes, for example.

Appellant argues that since Andrieu et al. use the symbol for generic diodes rather than the symbol specifically for Schottky diodes in Figures 3, 4, and 6, the diodes illustrated must not be Schottky diodes. In reply, it is noted that the Andrieu et al. disclosure is not limited to the use of a specific type of diode to protect cells against polarity reversal. Schottky diodes are mentioned as one embodiment, not an essential feature of the invention. The use of the generic

diode symbol in the schematics does not exclude the use of Schottky diodes, which are specifically mentioned in a specific embodiment.

Appellants assert neither Andrieu et al. nor Kawano et al. disclose "a current bypass connected between the anode and the cathode, the cell current bypass conducting current between the anode and the cathode to short circuit the electrochemical cell only at voltages more negative than the negative bypass voltage." However, one of ordinary skill in the art would recognize this as simply a description of a diode, so that the remarks above also apply to claims 12-14.

Appellants argue the limitation of claim 15, reciting "fully discharging the battery, and thereafter operating the battery in a series of charging and discharging cycles" has not been addressed. However, as was initially stated in the office action of 04 August 2003, Andrieu et al. state (column 2, lines 48-51) "Another object of the invention is to enable the use of batteries which *can be fully discharged*, such as...lithium-carbon batteries..." (emphasis added). Thus, fully discharging batteries is clearly intended in the Andrieu et al. reference.

Appellants state "there is no basis to believe that on could substitute a lithium oxide battery having a modified cathode, as recited in the present claims, into the approach of Andrieu" (See Appeal Brief, page 8) and further assert there is no reason to believe that the approach of Andrieu is operable with the materials set forth in Kawano et al. (See Appeal Brief, page 10.) In reply, it is noted that Andrieu et al. specifically state that their invention is "to enable the use of batteries which can be fully discharged, such as nickel-cadmium, nickel-hydride *or lithium-carbon batteries...*" (emphasis added.) Thus, lithium

secondary batteries having a carbon anode are clearly operable in the Andrieu et al. invention. Kawano et al. disclose "lithium–carbon" batteries since a preferred anode material of the Kawano et al. invention is graphite. (See column 5, lines 55-57.) Kawano et al. teach that their inventive battery has a high energy density, various superior characteristics, and a high safety level. (See column 5, lines 49-57.) This is an objective, stated advantage of the Kawano et al. invention. Therefore, it would have been obvious to one of ordinary skill in the art to use the battery cells disclosed by Kawano et al. in the system disclosed by Andrieu et al. in order to have a system with high energy density and high safety.

Appellants assert it would not be obvious to replace the batteries of Andrieu with a modified-cathode lithium metal oxide battery of Maeda. (See Appeal Brief, page 16.) In response, it is noted that contrary to appellants' assertion, Andrieu et al. teach their invention is applicable to not only lead-acid or nickel-cadmium batteries, but also nickel-hydride and lithium carbon batteries. (See column 2, lines 48-51.) Maeda et al. disclose spirally-wound lithium secondary batteries which include an anode of carbon active material. (See Maeda et al., column 5, lines 7-38.) The batteries disclosed by Maeda et al. are thus operable in Andrieu et al. invention. Maeda et al. further teach that their inventive batteries can suppress temperature rises in the batteries during charge and discharge, and therefore, the cycle life of the batteries can be improved. Therefore, it would have been obvious to one of ordinary skill in the art to use the batteries disclosed by Maeda et al. in the battery system disclosed by Andrieu et al. in order to improve the cycle life of batteries in the Andrieu et al. invention.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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cc
August 5, 2004

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